Restorative Thresholds for Carious Lesions

Innes, N. P. T.; Schwendicke, F.

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Restorative Thresholds for Carious Lesions: Systematic Review and Meta-analysis

N.P.T. Innes and F. Schwendicke

Appendix

Appendix 1a Modified Newcastle-Ottawa Scale adapted for cross-sectional survey studies

Points are awarded for cohort selection, comparability of groups and assessment of outcomes to a maximum of 10 points. In this analysis, studies that received ≥ 7 points were considered high quality, 4 to 6 moderate quality and 0 to 3 low quality.

Selection: (Maximum 5 points)

1) *Representativeness of the sample:*
   a. (1 point) Truly representative of the average population of dentists/therapists in the target population (all subjects or random sampling) or somewhat representative of the average in the target population (non-random sampling).
   b. (0 points) Selected group of users, limited to single specialty (e.g. paediatric dentists etc), single area/city or within a special group (e.g. members of research networks, dental students etc) or no description of sampling strategy.

2) *Sample size:*
   a. (1 point) Justified and satisfactory.
   b. (0 points) Not justified or too small to be representative.

3) *Non-respondents:*
   a. (1 point) Comparability between respondent and non-respondent characteristics was established, and the response rate was satisfactory.
   b. (0 points) The response rate is unsatisfactory, or the comparability between respondents and non-respondents is unsatisfactory or there was no description of the response rate or characteristics of responders and non-responders.

4) *Ascertainment of data on clinician's decision to intervene at carious lesion thresholds:*
   a. (2 points) Validated measurement tool.
   b. (1 point) Non-validated measurement tool, but the tool is available or described.
   c. (0 points) No description of the measurement tool.

Comparability: (Maximum 2 stars)

5) *The subjects in different outcome groups (e.g. specialty, setting, age) are comparable, based on the study design or analysis. Confounding factors are controlled:*
   a. (1 point) The study controls for the most important factor (select one).
   b. (1 point) The study control for any additional factor.

Outcome: (Maximum 3 stars)

6) *Assessment of the outcome:*

a. (2 points) Independent assessment of practitioner records.
b. (1 point) Self report.
c. (0 points) No description of the assessment process.

7) Statistical test:

a. (1 point) The reported descriptive statistics to describe the threshold levels for the population are complete with measures of dispersion (e.g. standard deviation, standard error and range) and if statistical tests are used to analyze associations, these are appropriate, and include confidence intervals and the probability levels (p value).
b. (0 points) The statistical tests were not appropriate, not reported, were incomplete or did not include proper measures of dispersion.

Appendix 1b Modified Newcastle-Ottawa Scale scores for included studies.

			Selection			Validity of survey	Outcome groups Comparability	Outcome		
Study ID			1) Sample representativeness (1 point max)	2) Sample size determination (1 point max)	3) Non-respondents (1 point max)	4) Ascertainment of data on clinician's decision to intervene (2 points max)	5) Confounders in different outcome groups (e.g. specialty, setting, age) are taken into consideration (2 points max)	6) Outcome assessment (2 points max)	7) Statistical test (1 point max)	**Total scores for studies (out of 10)**
Al Khatrash	2011		1	1	0	0	1	1	1	**5**
Baraba	2010		0	0	0	1	1	1	1	**4**
Baraba	2012		0	0	0	1	0	1	1	**3**
Bervian	2009		0	1	0	1	0	1	1	**4**
el-Mowafy	1994		1	0	0	1	0	1	1	**4**
Espelid	2001		1	0	1	1	1	1	1	**6**
Espelid	1985		1	0	1	1	1	1	1	**6**
Fellows	2014		0	1	0	2	1	1	1	**6**
Ghasemi	2008		0	0	0	2	1	1	1	**5**
Gilbert	2012		0	0	0	2	1	1	1	**5**
Gordan	2009		0	0	0	2	1	1	1	**5**
Heaven	2013		0	0	0	2	1	1	1	**5**
Kakudate	2012		0	0	0	2	1	1	1	**5**
Kay	1992		0	0	0	0	0	1	1	**2**
Kay	1996		0	0	0	0	0	1	1	**2**
Khalaf	2014		1	1	0	1	1	1	1	**6**
Kopperud	2016		1	0	0	1	1	1	1	**5**
Maupome	1997		0	0	0	1	0	1	1	**3**
Mejare	2009		1	0	1	1	1	1	1	**6**
Mileman	1988		1	0	1	1	1	1	1	**6**
Nuttall	1990		1	0	0	0	0	1	1	**3**
Rechmann	2016		1	0	0	1	1	1	1	**5**
Riley	2007		0	0	0	2	1	1	1	**5**
Riordan	1991		1	0	0	1	1	1	1	**5**
Swan	1993		0	0	0	0	0	1	1	**2**
Tan	2002		1	0	0	1	1	1	1	**5**
Tubert-Jeannin	2004		1	0	0	1	1	1	1	**5**
Tveit	1999		1	0	0	1	1	1	1	**5**
Vidnes-Kopperud	2011		1	0	0	1	1	1	1	**5**
Zadik	2008		0	0	0	1	1	1	1	**4**
Total scores for areas			**14**	**4**	**4**	**32**	**22**	**30**	**30**	

Appendix 2 Included studies

1. Al-Khatrash AA, Badran YM, Alomari QD. 2011. Factors affecting the detection and treatment of occlusal caries using the international caries detection and assessment system. Oper Dent. 36(6):597-607.
2. Baraba A, Anić I, Doméjean-Orliaguet S, Espelid I, Tveit AB, Miletić I. 2010. Survey of Croatian dentists' restorative treatment decisions on approximal caries lesions. Croat Med J. 51(6):509-514.
3. Baraba A, Doméjean S, Jurić H, Espelid I, Tveit AB, Anić I. 2012. Restorative treatment decisions of Croatian University teachers. Coll Antropol. 36(4):1293-1299.
4. Bervian J, Tovo MF, Feldens CA, Brusco LC, da Rosa FM. 2009. Evaluation of final-year dental students concerning therapeutic decision making for proximal caries. Braz Oral Res. 23(1):49-53.
5. el-Mowafy OM, Lewis DW. Restorative decision making by Ontario dentists. 1994. J Can Dent Assoc. 60(4):305-310, 313.
6. Espelid I, Tveit A, Haugejorden O, Riordan PJ. 1985. Variation in radiographic interpretation and restorative treatment decisions on approximal caries among dentists in Norway. Community Dent Oral Epidemiol. 13(1):26-29.
7. Espelid I, Tveit AB, Mejàre I, Sundberg H, Hallonsten A. 2001. Restorative treatment decisions on occlusal caries in Scandinavia. Acta Odontol Scand. 59(1):21-27.
8. Fellows JL, Gordan VV, Gilbert GH, Rindal DB, Qvist V, Litaker MS, Benjamin P, Flink H, Pihlstrom DJ, Johnson N. 2014. Dentist and practice characteristics associated with restorative treatment of enamel caries in permanent teeth: Multiple-regression modeling of observational clinical data from The National Dental PBRN. Am J Dent. 27(2):91-99.
9. Ghasemi H, Murtomaa H, Torabzadeh H, Vehkalahti MM. Restorative treatment threshold reported by Iranian dentists. 2008. Community Dent Health. 25(3):185-190.
10. Gilbert GH, Gordan VV, Funkhouser EM, Rindal DB, Fellows JL, Qvist V, Anderson G, Worley D. 2013. Caries treatment in a dental practice-based research network: Movement toward stated evidence-based treatment. Community Dent Oral Epidemiol. 41(2):143-153.
11. Gordan VV, Garvan CW, Heft MW, Fellows JL, Qvist V, Rindal ODB, Gilbert GH. 2009. Restorative treatment thresholds for interproximal primary caries based on radiographic images. Gen Dent. 57(6):654-663.
12. Heaven TJ, Gordan VV, Litaker MS, Fellows JL, Brad Rindal D, Firestone AR, Gilbert GH. 2013. Agreement among dentists' restorative treatment planning thresholds for primary occlusal caries, primary proximal caries, and existing restorations: Findings from the National Dental Practice-Based Research Network. J Dent. 41(8):718-725.
13. Kakudate N, Sumida F, Matsumoto Y, Manabe K, Yokoyama Y, Gilbert GH, Gordan VV. 2012. Restorative treatment thresholds for proximal caries in dental PBRN. J Dent Res. 91(12):1202-1208.
14. Kay E, Nuttall N, Knill-Jones R. 1992. Restorative treatment thresholds and agreement in treatment decision-making. Community Dent Oral Epidemiol. 20(5):265–8.
15. Kay EJ, Nuttall NM, Knill-Jones R. 1992. Restorative treatment thresholds and agreement in treatment decision-making. Community Dent Oral Epidemiol. 20(5):265-268.
16. Khalaf ME, Alomari QD, Ngo H, Doméjean S. 2014. Restorative treatment thresholds: Factors influencing the treatment thresholds and modalities of general dentists in Kuwait. Med Princ Pract. 23(4):357-362.
17. Kopperud SE, Tveit AB, Opdam NJM, Espelid I. 2016. Occlusal caries management: Preferences among dentists in Norway. Caries Res. 50(1):40-47.
18. Maupomé G, Sheiham A. 1997. Radiographic criteria employed to diagnose and treat approximal caries by final-year dental students in Mexico City. Community Dent Oral Epidemiol. 25(3):242-246.

19. Mejàre I, Sundberg H, Espelid I, Tveit AB. 1999. Caries assessment and restorative treatment thresholds reported by Swedish dentists. Acta Odontol Scand. 57(3):149-154.
20. Mileman PA, Espelid I. 1988. Decisions on restorative treatment and recall intervals based on bitewing radiographs. A comparison between national surveys of Dutch and Norwegian practitioners. Community Dent Health. 5(3):273-284.
21. Nuttall NM, Pitts NB. 1990. Restorative treatment thresholds reported to be used by dentists in Scotland. Brit Dent J. 169(5):119-126.
22. Rechmann P, Doméjean S, Rechmann BMT, Kinsel R, Featherstone JDB. Approximal and occlusal carious lesions Restorative treatment decisions by California dentists. J Am Dent Assoc 2016;147(5):328-338.
23. Riley III JL, Gordan VV, Rouisse KM, McClelland J, Gilbert GH. 2011. Differences in male and female dentists' practice patterns regarding diagnosis and treatment of dental caries Findings from the Dental Practice-Based Research Network. J Am Dent Assoc. 142(4):429-440.
24. Riordan PJ, Espelid I, Tveit AB.1991. 1991. Radiographic interpretation and treatment decisions among dental therapists and dentists in Western Australia. Community Dent Oral Epidemiol. 19(5):268-271.
25. Swan ES, Lewis DW. 1993. Ontario dentists: 2. Bitewing utilization and restorative treatment decisions. J Can Dent Assoc. 59(1):68-"70, 73".
26. Tan PLB, Evans RW, Morgan MV. 2002. Caries, bitewings, and treatment decisions. Aust Dent J. 47(2):138-141.
27. Tubert-Jeannin S, Doméjean-Orliaguet S, Riordan PJ, Espelid I, Tveit AB. 2004. Restorative treatment strategies reported by French university teachers. J Dent Educ. 68(10):1096-1103.
28. Tveit AB, Espelid I, Skodje F. 1999. Restorative treatment decisions on approximal caries in Norway. Int Dent J. 49(3):165-172.
29. Vidnes-Kopperud S, Tveit AB, Espelid I. 2011. Changes in the treatment concept for approximal caries from 1983 to 2009 in Norway. Caries Res. 45(2):113-120.
30. Zadik Y, Levin L. 2008. Clinical decision making in restorative dentistry, endodontics, and antibiotic prescription. J Dent Educ. 72(1):81-86.

Appendix 3a Data Extraction (study characteristics)

Study: First author surname (Publicat year)	Year of survey if stated	Dentists' or therapists (dropdown)	Dentists/ Therapists/ GDP Other Specialt	National, statewide, local	Country or countries or othe demographics	Number sampled	Number completing survey	Response rate or number	Other details of how surveyed	Lesion progression classification system PROXIMAL (see classification code)	Lesion progression classification system OCCLUSAL (see classification code)	Assessment system: Clinical/ in-vivo/ radiographic/ diagram (dropdown)	further assessment system detail	Primary or permanent teeth (dropdown)	Adults or children's teeth (dropdown)	Lesion location. occlusal/proxima both/ not stated (dropdown)	Other factors found to influence treatment decision ma
Al Khatrash (2011)	2009	dentists	Generalists, Restorative Specialists and other Specialists (not specified)	Nationwide	Kuwait	156	156	Purposively sampled to represent the regions of Kuwait	Random sample of 156 dentists drawn from membership of 1135 of the Kuwait Dental Association. Designed to proportionally repres the 6 regions of Kuwait.		2	in-vivo	teeth set up in resin blocks - assessed using ICDAS II	permanent	adults	occlusal	Restorative specialists less likely to treat teeth with enam caries restoratively compared with generalists or other specialists
Baraba (2010)	not stated	dentists	general dentists	Nationwide	Croatia	800	307	38%	Random sample of 400 dentists from the Cro Dental Society and 400 from a list at a congre	13		diagram	6 point scale on diagram of proxminal lesions	permanent	adults	proximal	
Baraba (2012)	not stated	dentists	university teachers	Local; Croatian dental schools	Croatia	120	59	49%	Questionnaire was distributed to teachers working in the 2 dental schools in Croatia (n=	13	1	other (state in next column)	6 point scale on diagram of proxminal lesions 5 scale o photographs of occlusal lesio	permanent	adults	both occ and prox	Croatian teachers intervened later than dentists in Croati Baraba 2010 study. Teachers more inclined towards non operative procedures compared to dentists.
Bervian (2009)	2002	dental students	general dentists	Statewide in Rio Grand do Sul.	Brazil	355	346	98%	Final year dental students from 6 private and public dental schools.	14		diagram	5 point scale on black and wh diagrams	both primary and permanen	children	proximal	Students more conseravative with primary teeth. Studen private institutions 72% more likely to intervene in enam lesions
el-Mowafy (1994)	1992	dentists	general dentists	Statewide. Province of Ontario	Canada	5743	1276	52%	Questionnaire mailed to half of practitioners Ontario randomly selected. 2 reminders sent.	15	4	other (state in next colum	written description of radiograph appearance	permanent	both ad and child	both occ and prox	More likely to intervene later stages in older people
Espelid (1985)	1983	dentists	741 sampled General Dentists	Nationwide	Norway	741	616	83%	Random sample of 758 dentists drawn from Norwegian Dental Association's register of authorised dentists excluding >69yrs, teachers specialists and administrators.	13		diagram	6 point scale on diagram of proxminal lesions	permanent	adults	proximal	Private practitioners restored lesions at an earlier stage compared to those in the public service. Older dentists te to restore enamel lesions more often than younger ones.
Espelid (2001)	1995 - 1996	dentists	not specified	Mixed; 2 countries sampled Nationwide (Norway and Sweden) and 1 Local (Denmark)	Norway, Sweden Denmark	240	240	Norway 84.4% (625); Sweden 70.5% (572); Denmark not random sample (173)	1995 and 1996. Danish were on a course, oth were a random sample and were sent questionnaire. Excluded >67 in Norway and 6 in Sweden, teachers specialists and administrators.		1	other (state in next colum	Photograph with written description	permanent	adults	occlusal	
Fellows (2014)	2006-2008	dentists	general dentists	Mixed; PBRN dentists 4 different states in US and Nationwide in Denmark/Sweden/ Norway	USA and Denmar Sweden/ Norwa	229	229	100% but dentists from the PBRN volunteered to take part	PBRN dentist enrolled up-to 50 consecutive restorations placed in permanent teeth. Only end results of restorations and not initial lesio UP TO 4 RESTORATIONS PER PATIENT	3	3	other (state in next colum	Observational practice data collected on restorations plac in consecutive teeth. "For les depth, dentists were asked "h deep did you estimate that t deepest part of the primary caries lesion was, preoperatively?"	permanent	can't tell	both occ and prox	"... only dentists's race-ethnicity was associated with differences in enamel restorations for proximal lesions o Non-hispanic White dentists were five times more likely minority dentists to place an enamel restoration." ... "... network region and practice type were important predict of variations ... ." Enamel lesion intervention rare among SK dentists compared with the US regardless of practice t
Ghasemi (2006)	2004-2005	dentists	general dentists	Local - dentists from dental meetings	Iran	1033	980	95%	Questionnaire was sent out to participants ov years at two annual dental meetings	9		diagram		permanent	children	proximal	Irregular dental visiting, poor OH and lots of filled, extrac and carious teeth increased intervention.
Gilbert (2012)	not stated	dentists	general dentists	Mixed; 5 US states and Denmark, Sweden and Norway	USA Denmark, Sweden and Norway	998	405	41%	Posted out to all DPBRN members in 5 states the US and across Denmark, Sweden and Nor	10		radiographic images for proximal with descriptions	radiographic images for proximal with descriptions	permanent	can't tell	proximal	Education. More move away from extremes of threshol "full participants" in the network.
Gordan (2009)	not stated	dentists	general dentists	Statewide; only DPBRN dentists	USA	901	500	55%	Questionnaires were emailed to all eligible dentists.	10		radiographic images for proximal with descriptions	radiographic images for proximal with descriptions	permanent	can't tell		
Heaven (2013)	not stated	dentists	Unclear	Statewide; variety of states linked to Network: Alabama/Mississippi	USA	901	565	63%	Dentists working in outpatient dental practice who had completed the network's Enrollmen Questionnaire. Remuneration for completed	10	1	other (state in next colum	diagram for proximal and clini pictures with descriptions o clinical and radiographic stat for occlusal.	permanent	adults	both occ and prox	Dentists who were more likely to recommend repair of restorations rather than replacement were more likley to recommend intervention at a later stage.
Kakudate (2012)	2011-2012	dentists	general dentists	Statewide; 7 regions in Japan	Japan	282	189	67%	Covered 7 states in Japan but all dentists were part of the Japan Dental PBRN. Not clear wha proportion or demographic that covered.	10		radiographic images for proximal with descriptions and 2 written clinical scenarios - high risk and low risk		permanent	adults	proximal	" [in] high-caries risk scenario, gender of dentist, city population, type of practice, conducting caries-risk assessment, and administering diet counseling were significant factors associated with surgical enamel intervention.However, for a low caries-risk scenario, city population, type of practice, and use of a dental explorer were the factors significantly associated with surgical ena intervention."
Kay (1992)	not stated	dentists	general dentists	unclear	Scotland	20	20	20 randomly selected dentists but no details	No further detail on how dentists were surveyed.	7		other (state in next column)	written description of radiograph appearance	permanent	adults	proximal	
Kay (1996)	not stated	dentists	general dentists	Local; One city in Scotland and One city Canada	Scotland, Canada	37	20 from Scotland and 17/20 from Canada	GDPs from Scotland and Canada were invited to participate	20 GDPs were randomly selected from dentis Glasgow. Canadian dentists were all part of t Community Dental Service in Toronto and no randomly selected	1		radiograph	simulated radiographs using teeth mounted to simulate a real mouth	permanent	can't tell	proximal	
Khalaf (2014)	not stated	dentists	general dentists	Nationwide	Kuwait	200	185	93%	200 randomly selected dentists from the Min of Health Kuwait were given the quetionnaire complete.	13	1	other (state in next column)	Proximal: diagram with writt descriptions. Occlusal: clinic photographs and written description	permanent	adults	both occ and prox	For occlusal lesions, more experienced practitioners and who had attended continuing education courses recently tended to intervene earlier.
Kopperud (2016)	2009	dentists	unclear	Nationwide	Norway	3785	2375	63%	Questionnaire emailed to all dentists register with the Norwegian Dental Association		1	other (state in next column)	photograph with written description	permanent	adults	occlusal	
Maupome (1997)	not stated	dental students	general dentists	Local; 7 out of the 9 dental schools in Mexico City	Mexico	412	407	99%	Questionnaire to random sample of final yr dental students in 7/9 dental schools in Mexi City.	12		diagram		permanent	adults	proximal	
Mejare (1999)	1996	dentists	general dentists	National	Sweden	923	590	64%	Random sample of 923 dentists from Swedish National Board of Health and Welfare's regist of dentists. Excluded dentists over 60 years	13	1	diagram	Proximal: diagram with writt descriptions. Occlusal: clinic photographs and written description	permanent	children	both occ and prox	Private practitioners restored lesions at an earlier stage compared to those in the public service.
Mileman (1988)	1985	dentists	general dentists	Nationwide	Norway	general dentists	960 (Norwegian 616 and Dutch 344)	83% Norway 77% in Netherlands	Computer generated national random sample from each country's national dentist register sent questionnaires. Excluded retired and thos in the school dental service	12		diagram	diagram and written descripti	permanent	can't tell	proximal	
Nuttall (1990)	1987	dentists	general dentists	Nationwide	Scotland, UK	1726	1127	65%	1987 Questionnaire posted to all registered dentists practicing in Scotland (1726)	15		other (state in next column)	written description of radiograph appearance	permanent	both ad and child	proximal	Tendency for participants to report that they would place restoration at an earlier stage of lesion development in younger patient compared to older one.
Rechmann (2016)	2013	dentists	87.5% GDPs; 12.5 specialists including 5.9% paediatric specialists	Statewide (California)	USA	16736	1842	11%	Questionnaire emailed to all 16,960 dentists i California.	5	1	other (state in next column)	diagram for proximal and clini pictures with descriptions o clinical and radiographic stat for occlusal.	permanent	adults	both occ and prox	Dentists who graduated more recently were less likely to intervene restoratively early.
Riley (2011)	not stated	dentists	general dentists	Statewide but covering 5 states - for DPBRN members	USA	936	534	57%	Practitioners were all members of the DPBRN mainly from 5 states: Alabama/Mississippi, Florida/Georgia, Minnesota	4	1	other (state in next colum	radiographic images for proximal and clinical pictures occlusal but unclear whethe there were written descriptio of clinical and radiographic states.	both primary and permanen	both ad and child	both occ and prox	Female dentists more conservative. More recent gradua more conservative.
Riordan (1991)	1990	both dent an ther	General dentists and Therapists	Statewide; Western Australia	Australia	Dentists 49 Therapists 247	252 (Dentists 45, Therapist 207)	Dentists = 92% therapists = 849	Questionnaire sent out to all dentists and therapists in the Dental Services of the Health Dept of Western Australia	12		diagram		permanent	can't tell	proximal	Dentists more conservative than therapists. Dental thera more likley to consider restoring lesions confined to enar
Swan (1993)	1991	dentists	general dentists	Statewide, Province of Ontario	Canada	536	413	77%	Questionnaire posted to an unspecified samp Ontario dentists	3		other (state in next column	unclear	permanent	can't tell	proximal	
Tan (2002)	1996	dentists	general dentists	Statewide; Victoria	Australia	556	356	64%	Postal survey of 1/4 of the Victoria Dental Bo dentists.	6		other (state in next column)	written descriptions	permanent	can't tell	proximal	
Tubert-Jeannin (2004)	2003	dentists	operative dentis teachers	Nationwide	France	180	86	48%	List of all practitioners (n=180) from 2002 directory of dental schools' hospital centres. Questionnaire sent 2003 and reminder 2 mon later.	5	1	other (state in next column)	Proximal: diagram with writt descriptions. Occlusal: clinic photographs and written description	permanent	can't tell	both occ and prox	
Tviet (1999)	1995	dentists	dentists	Nationwide	Norway	758	640	84%	Random sample of 758 dentists in 1995 drawn from Norwegian Dental Association's register authorised dentists excluding >69yrs, teachers specialists and administrators.	11		diagram		permanent	adults	proximal	Younger dentists less likely to intervene early
Vidnes-Kopperud (2011)	2009	dentists	can't tell	Nationwide	Norway	3654	2375	61%	Part of survey by Kopperund of occlusal lesions	13		diagram		permanent	adults	proximal	Compared studies in 1983, 1995 and 2009 in Norway usin similar diagram to investigate threshold - move towards l invasive intervention
Zadik (2008)	not stated	dentists	general dentists	Local; multi-national in terms of school graduated from. 52 Israeli dental school graduates, Eastern European 22 (Russia, Romania, Ukraine and Hungary); 11 from Lat America (Mexico, Argentina), 5 from Western Europe/US/ Canada		98	85	87%	Dentists surveyed during a convention of the Dental Division of the Israeli Defense Forces - convenience sample of 98 GDPs	2		other (state in next colum	written description	permanent	adults	proximal	

Appendix 3b Data Extraction (data table)

Study: First author surname (Publication year)	Dentition	STATUS proximal	% intervening at E1 (outer half enamel)	% intervening at E2 (inner half enamel)	% intervening at ADJ	% intervening at D1 (outer 1/3 dentine)	% intervening at D2 (outer half of dentine)	% intervening at D3 (inner half of dentine)	% intervening at other level if different classification system	STATUS occlusal	Occlusal Grade 1	Occlusal Grade 2	Occlusal Grade 3	Occlusal Grade 4	Occlusal Grade 5
Al Khatrash (2011)	Permanent								ICDAS II: codes 0,1,2,3 (caries in enamel) = 42.9% and 47.4% codes >3 (caries in outer dentine) = 85.9% and 81.4% (?take a mean of these as was from 2 different teeth						
Baraba (2010)	Permanent		10	32	39	18	1	0							
Baraba (2012)	Permanent		14	19	32	30	0	0			0	20	65	5	0
Bervian (2009)	Permanent (Primary only occlusal)			6	23				Primary: A) outer 1/3 enamel 2% ; B) 2/3 enamel 4% ; c) ADJ 22.5% D) outer 1/3 dentine 49.7% E) outer 2/3 dentine 21.7% Permanent A) outer 1/3 enamel 2.6% ; B) 2/3 enamel 6.6% ; c) ADJ 28.9% D) outer 1/3 dentine						
el-Mowafy (1994)	Permanent	12 year old	9		51	40	0			written description of appearance of tooth 1. white opacity or dark stain 2. grey discoloration around stained fissure 3. cavity 0.5mm diameter with hard floor 4. 0.5mm diameter with soft floor 5. Cavity >0.5mm with soft floor					
	Permanent	30 year old	1		27	67	0			1. 10% 2. 25% 3. 21% 4. 41% 5. 3%					
	Permanent	55 year old	1		19	67	1			1. 3% 2. 14% 3. 16% 4. 56% 5. 12%					
	Permanent		4		32					1. 2% 2. 10% 3. 13% 4. 55% 5. 21%					
Espelid (1985)	Permanent		2	19	44	30	4	1							
Espelid (2001)	Permanent									Norway	1	17	70	12	1
	Permanent									Sweden	0	6	67	27	0
	Permanent									Denmark	0	5	70	24	1
Fellows (2014)	Permanent	AL/MS	2	10		45	28	15		AL/MS	7	17	45	22	9
		FL/GA	2	5		50	35	9		FL/GA	4	13	52	24	6
		MN	0	4		54	31	10		MN	1	5	57	28	9
	Permanent		1	6		54	29	10			4	4	4	4	4
		PDA	0	4		63	24	8		PDA	2	9	56	24	8
	Permanent	SK	0	1		44	38	18		SK	1	3	43	44	9
Ghasemi (2006)	Permanent		28	49		19		3	**high risk** ; outer 1/2 enamel 28%, inner 1/2 49%, outer 1/2						
	Permanent		7	25		58		10							
	Permanent		18	37	0	39	0	7							
Gilbert (2012)	Permanent		2	38		53	8	1			can't tell what minimal interventi on means				
Gordan (2009)	Permanent		9	66		24	0	0	low risk: outer 1/2 enamel 1.8%, inner 1/2 enamel 39%, outer 1/3 dentine 54%, middle 1/3 dentine 5%, inner 1/2 dentine						
	Permanent		2	39		54	5	0							
	Permanent		6	53	0	39	3	0							
Heaven (2013)	Permanent	High risk	10	68		21	0	0		High risk	4	21	40	33	2
	Permanent	Low risk	2	42		54	3	0		Low risk	1	9	34	48	7
	Permanent		6	55		38	2	0			3	15	37	41	5
Kakudate (2012)	Permanent	High risk	19	55		23	3	1							
	Permanent	Low risk	4	43		43	9	2							
	Permanent		12	49		33	6	2							
Kay (1992)	Permanent		0	15	40	45									
Kay (1996)	Permanent	Canadian	75			25									
	Permanent	Scottish	55			45									
Khalaf (2014)	Permanent		2	8	7	40	19	24	II 4.3 III 28.1 VI 43.1 V 23.8			4	43		
Kopperud (2016)	Permanent										0	12	68	19	1
Maupome (1997)	Permanent		27	19											
Mejare (1999)	Permanent		0	1	4	42	52	1			0	6	67	27	0
Mileman (1988)	Permanent	Norway	22		45	30	3								
	Permanent	Dutch	10		45	39	6								
Nuttall (1990)	Permanent			5	26				**For 12 year old:** 1 Outer 1/2 enamel = 8.4%; up to but not beyond the ADJ = 35.8%; extending just beyond the ADJ = 25.8%; outer 1/2 of dentine = 28.6%; into the inner 1/2 of dentine = 1.4%. **For 30 year old:** 1. Outer 1/2 enamel = 3.1%; 2. up to but not beyond the ADJ = 17%; extending just beyond the ADJ = 19.3%; outer 1/2 of dentine = 48.6%; into the inner 1/2 of dentine = 12%						
Rechmann (2016)	Permanent		3	15	43	33	4	2	**GP** grades 1/2 = 18.3%, grade 3= 43.9%, grade 4 = 32.3% grade 5/6 92% **Pediatric dentist** grade 1/2 = 9.3% grade 3 = 30.6% grade 4 = 49.1% grade 5/6 = 11.1%		2	39	50	8	2
Riley (2011)	Permanent	low risk adult	39			59		3		Occlual lesion in low risk adult	9		34	57	
	Permanent	high risk adult	72			28		0		Occlusal lesion in high risk adult:	21		44	36	
	Permanent		55								11		39		
	Primary									Occlusal lesion child:	14		41	45	
Riordan (1991)	Permanent	Dentists	2	9	29	40	11	9							
	Permanent	Therapists	1	12	40	37	7	2							
Swan (1993)	Permanent		24		47	29									
Tan (2002)	Permanent		5		45	44	4	1	1% didn't want to intervene even when near pulp						
Tubert-Jeannin (2004)	Permanent		2	20	39	31	6	2			1	20	67	12	0
Tviet (1999)	Permanent			4	15	62	19	1							
Vidnes-Kopperud (2011)	Permanent		0	0	7	57	36	0							
Zadik (2008)	Permanent			6											
	Permanent			5											
	Permanent			18											
	Permanent			58											
	Permanent			59											
	Permanent			46											
	Permanent			65											
	Permanent			59											
	Permanent			54											

Appendix 4. Different threshold grading systems used in studies

Occlusal surfaces

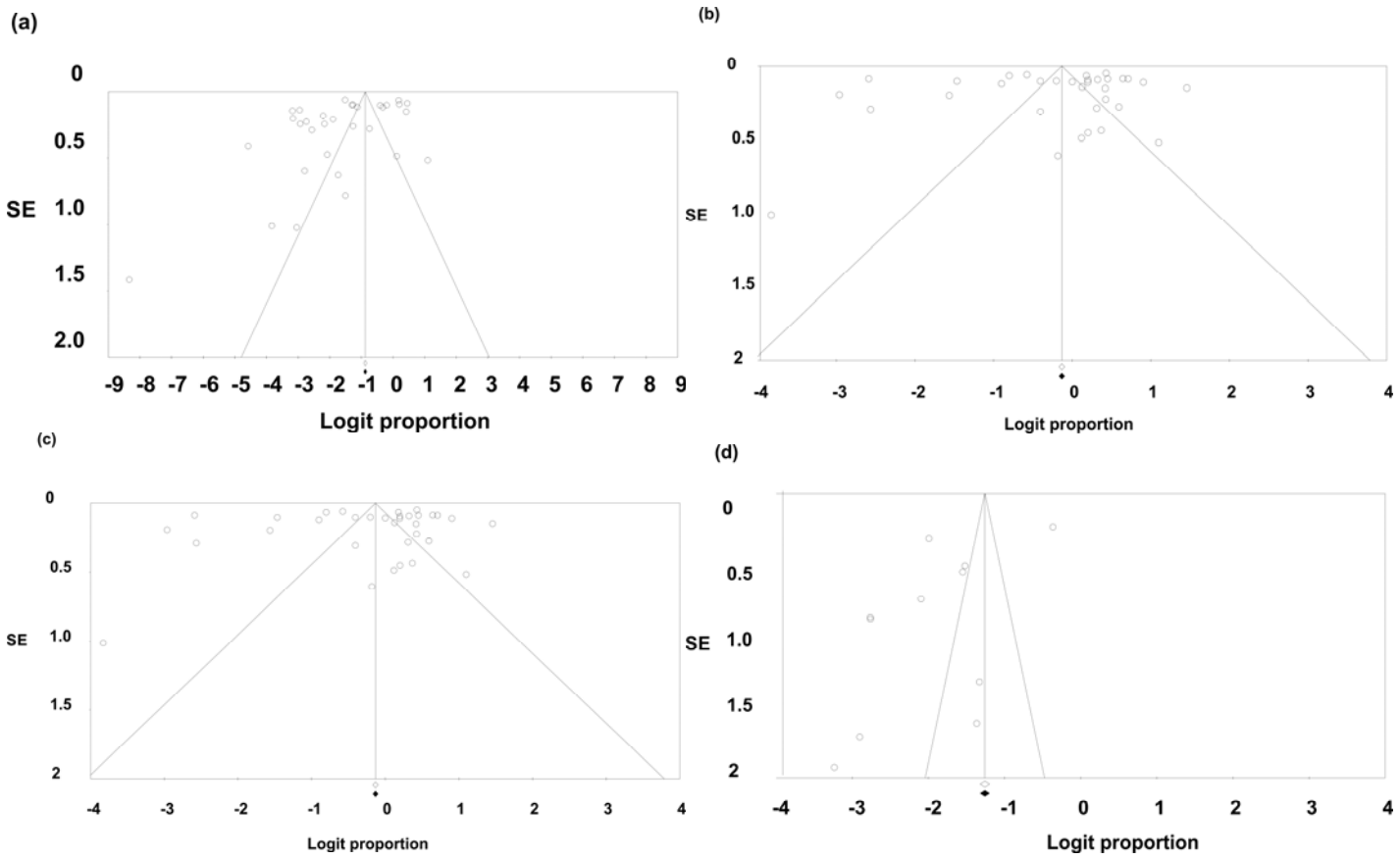
Grading system (detail)	**System coding number (no of studies using that system)**
Grade 1. Caries characterized by white/ brownish discoloration in enamel, no cavitation. No rad signs of caries. Grade 2. Minor loss of tooth substance with a break in the enamel surface or discolored surface or discolored fissures with grey/opaque enamel and / or caries confined to the enamel. No rad signs of caries. Grade3. Moderate loss of tooth substance and/or caries in the outer 1/3 of dentin according to rad. Grade 4. Considerable loss of tooth substance and/or caries in the middle 1/3 of dentin according to rad. Grade 5. Considerable loss of tooth substance and/or caries in inner 1/3 of dentin according to rad.	1 (9 studies)
0 Sound; no change in enamel translucency after prolonged air drying (>5 seconds). 1. First visual changes in enamel; opacity or discolouration not visible on the wet surface, but distinctively visible after air drying, or changes seen on a wet surface, but limited to the confines of the pit and fissure area. 2. Distinct visual change in enamel; opacity or discolouration distinctly visible on a wet surface and/or wider than the fissure fossa area. 3. Localized enamel breakdown due to caries with no visible dentin or underlying shadow. 4. Underlying dark shadow from dentin with or without localized enamel breakdown. 5. Distinct cavity in opaque or discolored enamel exposing the dentin. 6. Extensive distinct cavity with visible dentin and more than half of the surface involved.	2 (1 study)
1) E1: outer ½ of enamel, 2) E2: inner ½ of enamel, 3) D1: outer 1/3 of dentin, 4) D2: middle 1/3 of dentin, 5) D3: inner 1/3 of dentin, or 6) uncertain.	3 (1 study)
written description of appearance of tooth 1. white opacity or dark stain 2. grey discoloration around stained fissure 3. cavity 0.5mm diameter with hard floor 4. 0.5mm diameter with soft floor 5. cavity >0.5mm with soft floor	4 (1 study)

Proximal surfaces

1. before the lesion has reached the EDJ 2. at the EDJ 3. into dentin	1 (1 study)
1. enamel caries; 2. caries at EDJ	2 (1 study)

1. In enamel, 2. at EDJ, 3. In dentin	3 (1 study)
1. outer 1/2 enamel; 2 inner 1/2 enamel 3. outer 1/3 dentin 4. middle 1/3 dentin 5. inner 1/3 dentin.	4 (1 study)
1. outer 1/2 enamel; 2 lesion in inner 1/2 enamel 3. lesion at EDJ 4. outer 1/3 dentin 5. middle 1/3 dentin 6. inner 1/3 dentin.	5 (2 studies)
1. outer 1/2 of enamel; 2. to EDJ 3. extending slightly beyond the EDJ into dentin 4. confined to the outer 1/2 of dentin 5. in close proximity to the pulp	6 (1 study)
1. up to 1/2 of enamel; 2. deeper 1/2 of enamel but not reached EDJ; 3. reached ADJ but has not penetrated dentin; 4. lesion extended into dentin; 5. lesion extended well into dentin	7 (1 study)
1) E1: outer ½ of enamel, 2) E2: inner ½ of enamel, 3) D1: outer 1/3 of dentin, 4) D2: middle 1/3 of dentin, 5) D3: inner 1/3 of dentin, or 6) uncertain.	8 (1 study)
1) outer 1/2 enamel, 2) inner 1/2 enamel, 3) outer 1/2 dentin, 4) inner 1/2 dentin	9 (1 study)
1) outer 1/2 enamel, 2) inner 1/2 enamel, 3) outer 1/3 dentin, 4) middle 1/3 dentin, 5) inner 1/2 dentin	10 (4 studies)
1) outer 1/2 enamel; 2) between outer 1/2 and outer 2/3 enamel; 3) to EDJ; 4) outer 1/3 dentin; 5) between outer 1/3 and outer 1/2 dentin; 6) inner 2/3 dentin	11 (1 study)
1) outer 1/2 enamel; 2) between outer 1/2 and outer 2/3 enamel; 3) to EDJ; 4) outer 1/3 dentin; 5) between outer 1/3 and outer 1/2 dentin; 6) not more than 2/3 of dentin depth	12 (3 studies)
1) outer 1/2 enamel; 2) inner 1/2 enamel; 3) EDJ; 4) outer 1/3 dentin; 5) not more than 2/3 of dentin depth; 6) inner 2/3 dentin	13 (6 studies)
A) outer 1/3 enamel; B) 2/3 enamel; C) up to EDJ D) outer 1/3 dentin E) involving 2/3 dentin	14 (1 study)
written description of bitewing radiographic appearance for "generally increased radiolucency confined to: 1. Outer 1/2 enamel; 2. up to but not beyond the EDJ; 3. extending just beyond the EDJ; 4. into the inner 1/2 of dentin	15 (2 studies)

Appendix 5. Funnel Plots



(a) Standard errors of estimates from different studies plotted on the logit proportion of dentists intervening invasively (restoratively) at E1/E2 level for proximal carious lesions. An asymmetric distribution of studies indicates publication bias.

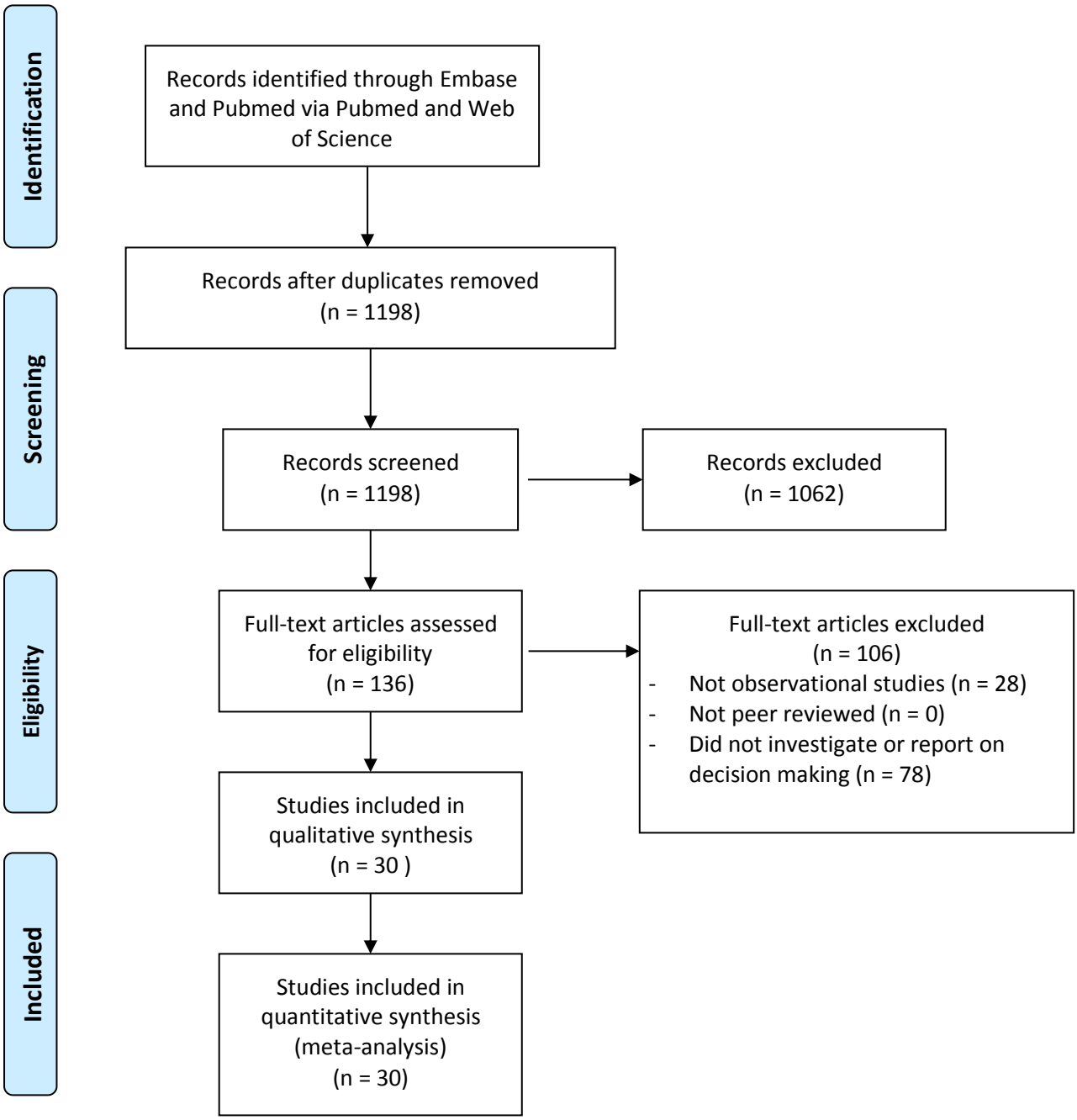
(b) Standard errors of estimates from different studies plotted on the logit proportion of dentists intervening invasively (restoratively) at E1/E2/EDJ level for proximal lesions.

(c) Standard errors of estimates from different studies plotted on the logit proportion of dentists intervening invasively (restoratively) for occlusal carious lesions confined to enamel.

(d) Standard errors of estimates from different studies plotted on the logit proportion of dentists intervening invasively (restoratively) for occlusal lesions clinically and/or radiographically involving enamel and/or dentin.

Appendix 3a Data Extraction (study characteristics)

	Study: First author surname (Publication year)	Year of survey if stated	Dentists' or therapists (dropdown)	Dentists/ Therapists/ GDPs/ Other Specialty	National, statewide, local	Country or countries or other demographics	Number sampled	Number completing survey	Response rate or number	Other details of how surveyed	Lesion progression classification system PROXIMAL (see classification code)	Lesion progression classification system OCCLUSAL (see classification code)	Assessment system: Clinical/ in-vivo/ radiographic/ diagram (dropdown)	further assessment system detail	Primary or permanent teeth (dropdown)	Adults or children's teeth (dropdown)	Lesion location. occlusal/proximal / both/ not stated (dropdown)	Other factors found to influence treatment decision making
1	**Al Khatrash (2011)**	2009	dentists	Generalists, Restorative Specialists and other Specialists (not specified)	Nationwide	Kuwait	156	156	Purposively sampled to represent the regions of Kuwait	Random sample of 156 dentists drawn from membership of 1135 of the Kuwait Dental Association. Designed to proportionally represent the 6 regions of Kuwait.		2	in-vivo	teeth set up in resin blocks - assessed using ICDAS II	permanent	adults	occlusal	Restorative specialists less likely to treat teeth with enamel caries restoratively compared with generalists or other specialists
2	**Baraba (2010)**	not stated	dentists	general dentists	Nationwide	Croatia	800	307	38%	Random sample of 400 dentists from the Croatian Dental Society and 400 from a list at a congress.	13		diagram	6 point scale on diagram of proxminal lesions	permanent	adults	proximal	
3	**Baraba (2012)**	not stated	dentists	university teachers	Local; Croatian dental schools	Croatia	120	59	49%	Questionnaire was distributed to teachers working in the 2 dental schools in Croatia (n=120)	13	1	other (state in next column)	6 point scale on diagram of proxminal lesions 5 scale on photographs of occlusal lesions	permanent	adults	both occ and prox	Croatian teachers intervened later than dentists in Croatia in Baraba 2010 study. Teachers more inclined towards non-operative procedures compared to dentists.
4	**Bervian (2009)**	2002	dental students	general dentists	Statewide in Rio Grande do Sul.	Brazil	355	346	98%	Final year dental students from 6 private and 3 public dental schools.	14		diagram	5 point scale on black and white diagrams	both primary and permanent	children	proximal	Students more conseravative with primary teeth. Students in private institutions 72% more likely to intervene in enamel lesions
5	**el-Mowafy (1994)**	1992	dentists	general dentists	Statewide. Province of Ontario	Canada	5743	1276	52%	Questionnaire mailed to half of practitioners in Ontario randomly selected. 2 reminders sent.	15	4	other (state in next column)	written description of radiograph appearance	permanent	both ad and child	both occ and prox	More likely to intervene later stages in older people
6	**Espelid (1985)**	1983	dentists	741 sampled General Dentists	Nationwide	Norway	741	616	83%	Random sample of 758 dentists drawn from Norwegian Dental Association's register of authorised dentists excluding >69yrs, teachers specialists and administrators.	13		diagram	6 point scale on diagram of proxminal lesions	permanent	adults	proximal	Private practitioners restored lesions at an earlier stage compared to those in the public service. Older dentists tended to restore enamel lesions more often than younger ones.
7	**Espelid (2001)**	1995 - 1996	dentists	not specified	Mixed; 2 countries sampled Nationwide (Norway and Sweden) and 1 Local (Denmark)	Norway, Sweden, Denmark	240	240	Norway 84.4% (625); Sweden 70.5% (572); Denmark not random sample (173)	1995 and 1996. Danish were on a course, others were a random sample and were sent questionnaire. Excluded >67 in Norway and 65yrs in Sweden, teachers specialists and administrators.		1	other (state in next column)	Photograph with written description	permanent	adults	occlusal	
8	**Fellows (2014)**	2006-2008	dentists	general dentists	Mixed; PBRN dentists in 4 different states in US and Nationwide in Denmark/Sweden/ Norway	USA and Denmark/ Sweden/ Norway	229	229	100% but dentists from the PBRN volunteered to take part	PBRN dentist enrolled up-to 50 consecutive restorations placed in permanent teeth. Only saw end results of restorations and not initial lesions. UP TO 4 RESTORATIONS PER PATIENT	3	3	other (state in next column)	Observational practice data collected on restorations placed in consecutive teeth. "For lesion depth, dentists were asked "how deep did you estimate that the deepest part of the primary caries lesion was, preoperatively?"	permanent	can't tell	both occ and prox	"... only dentists's race-ethnicity was associated with differences in enamel restorations for proximal lesions only. Non-hispanic White dentists were five times more likely than minority dentists to place an enamel restoration." ... "... network region and practice type were important predictors of variations ... ." Enamel lesion intervention rare among the SK dentists compared with the US regardless of practice type.
9	**Ghasemi (2006)**	2004-2005	dentists	general dentists	Local - dentists from dental meetings	Iran	1033	980	95%	Questionnaire was sent out to participants over 2 years at two annual dental meetings	9		diagram		permanent	children	proximal	Irregular dental visiting, poor OH and lots of filled, extracted and carious teeth increased intervention.
10	**Gilbert (2012)**	not stated	dentists	general dentists	Mixed; 5 US states and Denmark, Sweden and Norway	USA Denmark, Sweden and Norway	998	405	41%	Posted out to all DPBRN members in 5 states of the US and across Denmark, Sweden and Norway	10		radiographic images for proximal with descriptions	radiographic images for proximal with descriptions	permanent	can't tell	proximal	Education. More move away from extremes of thresholds in "full participants" in the network.
11	**Gordan (2009)**	not stated	dentists	general dentists	Statewide; only DPBRN dentists	USA	901	500	55%	Questionnaires were emailed to all eligible dentists.	10		radiographic images for proximal with descriptions	radiographic images for proximal with descriptions	permanent	can't tell		
12	**Heaven (2013)**	not stated	dentists	Unclear	Statewide; variety of states linked to Network: Alabama/Mississippi, Florida/ Georgia, Minnesota, Oregon	USA	901	565	63%	Dentists working in outpatient dental practices who had completed the network's Enrollment Questionnaire. Remuneration for completed questionnaires, returned by post in pre-addressed envelope.	10	1	other (state in next column)	diagram for proximal and clinical pictures with descriptions of clinical and radiographic state for occlusal.	permanent	adults	both occ and prox	Dentists who were more likely to recommend repair of restorations rather than replacement were more likley to recommend intervention at a later stage.
13	**Kakudate (2012)**	2011-2012	dentists	general dentists	Statewide; 7 regions in Japan	Japan	282	189	67%	Covered 7 states in Japan but all dentists were part of the Japan Dental PBRN. Not clear what proportion or demographic that covered.	10		radiographic images for proximal with descriptions and 2 written clinical scenarios - high risk and low risk		permanent	adults	proximal	" [in] high-caries risk scenario, gender of dentist, city population, type of practice, conducting caries-risk assessment, and administering diet counseling were significant factors associated with surgical enamel intervention.However, for a low caries-risk
14	**Kay (1992)**	not stated	dentists	general dentists	unclear	Scotland	20	20	20 randomly selected dentists but no details	No further detail on how dentists were surveyed.	7		other (state in next column)	written description of radiograph appearance	permanent	adults	proximal	
15	**Kay (1996)**	not stated	dentists	general dentists	Local; One city in Scotland and One city in Canada	Scotland, Canada	37	20 from Scotland and 17/20 from	GDPs from Scotland and Canada were invited to participate	20 GDPs were randomly selected from dentists in Glasgow. Canadian dentists were all part of the Community Dental Service in Toronto and not randomly selected	1		radiograph	simulated radiographs using teeth mounted to simulate a real mouth	permanent	can't tell	proximal	
16	**Khalaf (2014)**	not stated	dentists	general dentists	Nationwide	Kuwait	200	185	93%	200 randomly selected dentists from the Ministry of Health Kuwait were given the quetionnaire to complete.	13	1	other (state in next column)	Proximal: diagram with written descriptions. Occlusal: clinical photographs and written description	permanent	adults	both occ and prox	For occlusal lesions, more experienced practitioners and those who had attended continuing education courses recently, tended to intervene earlier.
17	**Kopperud (2016)**	2009	dentists	unclear	Nationwide	Norway	3785	2375	63%	Questionnaire emailed to all dentists registered with the Norwegian Dental Association		1	other (state in next column)	photograph with written description	permanent	adults	occlusal	
18	**Maupome (1997)**	not stated	dental students	general dentists	Local; 7 out of the 9 dental schools in Mexico City	Mexico	412	407	99%	Questionnaire to random sample of final yr dental students in 7/9 dental schools in Mexico City.	12		diagram		permanent	adults	proximal	
19	**Mejare (1999)**	1996	dentists	general dentists	National	Sweden	923	590	64%	Random sample of 923 dentists from Swedish National Board of Health and Welfare's register of dentists. Excluded dentists over 60 years	13	1	diagram	Proximal: diagram with written descriptions. Occlusal: clinical photographs and written description	permanent	children	both occ and prox	Private practitioners restored lesions at an earlier stage compared to those in the public service.
20	**Mileman (1988)**	1985	dentists	general dentists	Nationwide	Norway	general dentists	960 (Norwegian 616 and	83% Norway 77% in Netherlands	Computer generated national random samples from each country's national dentist register - sent questionnaires. Excluded retired and those in the school dental service	12		diagram	diagram and written description	permanent	can't tell	proximal	
21	**Nuttall (1990)**	1987	dentists	general dentists	Nationwide	Scotland, UK	1726	1127	65%	1987 Questionnaire posted to all registered dentists practicing in Scotland (1726)	15		other (state in next column)	written description of radiograph appearance	permanent	both ad and child	proximal	Tendency for participants to report that they would place a restoration at an earlier stage of lesion development in younger patient compared to older one.
22	**Rechmann (2016)**	2013	dentists	87.5% GDPs; 12.5% specialists including 5.9% paediatric specialists	Statewide (California)	USA	16736	1842	11%	Questionnaire emailed to all 16,960 dentists in California.	5	1	other (state in next column)	diagram for proximal and clinical pictures with descriptions of clinical and radiographic state for occlusal.	permanent	adults	both occ and prox	Dentists who graduated more recently were less likely to intervene restoratively early.
23	**Riley (2011)**	not stated	dentists	general dentists	Statewide but covering 5 states for DPBRN members	USA	936	534	57%	Practitioners were all members of the DPBRN and mainly from 5 states: Alabama/Mississippi, Florida/Georgia, Minnesota	4	1	other (state in next column)	radiographic images for proximal and clinical pictures for occlusal but unclear whether there were written descriptions of clinical and radiographic states.	both primary and permanent	both ad and child	both occ and prox	Female dentists more conservative. More recent graduates more conservative.
24	**Riordan (1991)**	1990	both dent and ther	General dentists and Therapists	Statewide; Western Australia	Australia	Dentists 49 Therapists 347	252 (Dentists 45, Therapist 207)	Dentists = 92% therapists = 84%	Questionnaire sent out to all dentists and therapists in the Dental Services of the Health Dept of Western Australia	12		diagram		permanent	can't tell	proximal	Dentists more conservative than therapists. Dental therapists more likley to consider restoring lesions confined to enamel.
25	**Swan (1993)**	1991	dentists	general dentists	Statewide, Province of Ontario	Canada	536	413	77%	Questionnaire posted to an unspecified sample of Ontario dentists	3		other (state in next column	unclear	permanent	can't tell	proximal	
26	**Tan (2002)**	1996	dentists	general dentists	Statewide; Victoria	Australia	556	356	64%	Postal survey of 1/4 of the Victoria Dental Board dentists.	6		other (state in next column)	written descriptions	permanent	can't tell	proximal	
27	**Tubert-Jeannin (2004)**	2003	dentists	operative dentistry teachers	Nationwide	France	180	86	48%	List of all practitioners (n=180) from 2002 directory of dental schools' hospital centres. Questionnaire sent 2003 and reminder 2 months later.	5	1	other (state in next column)	Proximal: diagram with written descriptions. Occlusal: clinical photographs and written description	permanent	can't tell	both occ and prox	
28	**Tviet (1999)**	1995	dentists	dentists	Nationwide	Norway	758	640	84%	Random sample of 758 dentists in 1995 drawn from Norwegian Dental Association's register of authorised dentists excluding >69yrs, teachers specialists and administrators.	11		diagram		permanent	adults	proximal	Younger dentists less likely to intervene early
29	**Vidnes-Kopperud (2011)**	2009	dentists	can't tell	Nationwide	Norway	3654	2375	61%	Part of survey by Kopperund of occlusal lesions	13		diagram		permanent	adults	proximal	Compared studies in 1983, 1995 and 2009 in Norway using similar diagram to investigate threshold - move towards less invasive intervention
30	**Zadik (2008)**	not stated	dentists	general dentists	Local; multi-national in terms of school graduated from. 52 Israeli dental school graduates, Eastern European 22 (Russia, Romania, Ukraine and Hungary); 11 from Latin America (Mexico, Argentina), 5 from Western Europe/US/ Canada		98	85	87%	Dentists surveyed during a convention of the Dental Division of the Israeli Defense Forces convenience sample of 98 GDPs	2		other (state in next column	written description	permanent	adults	proximal	



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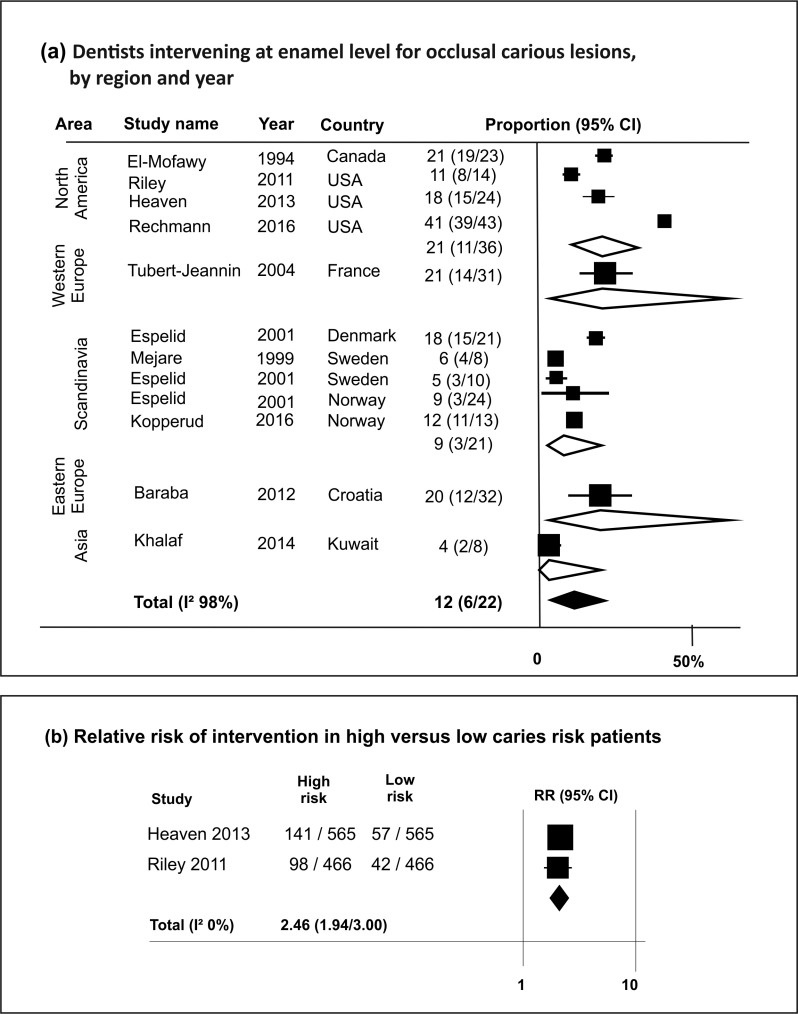
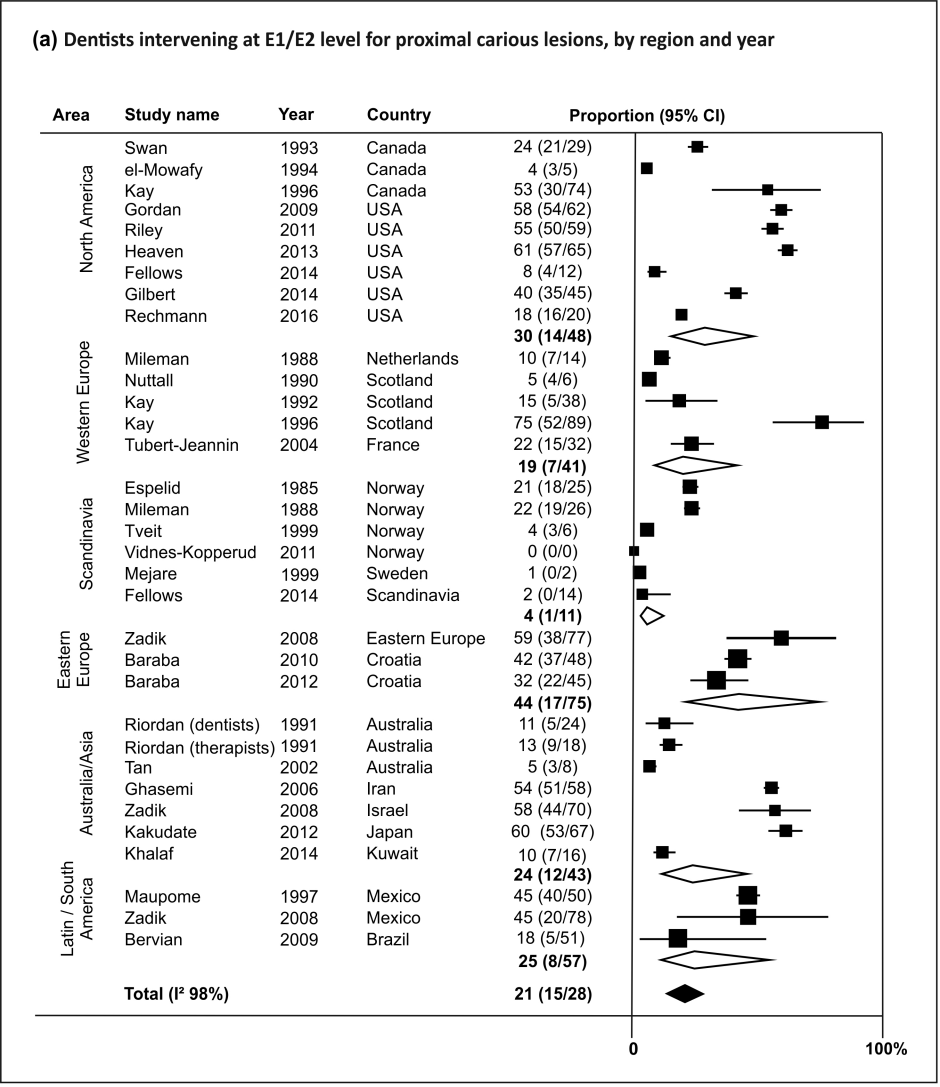
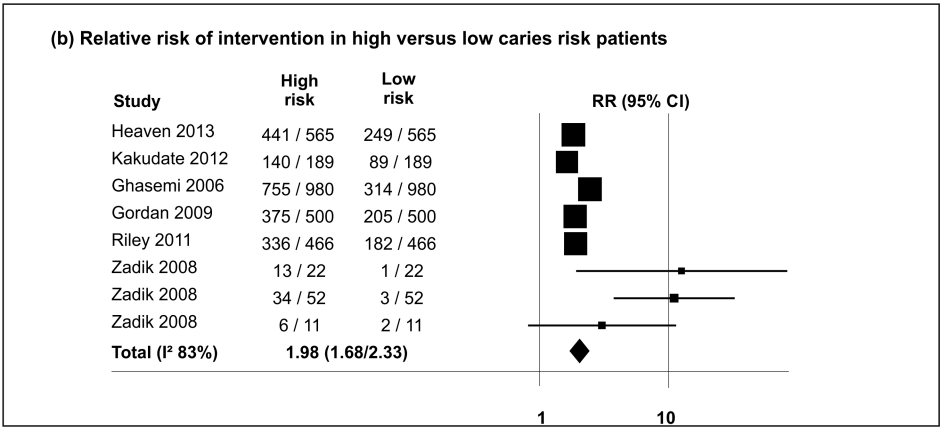
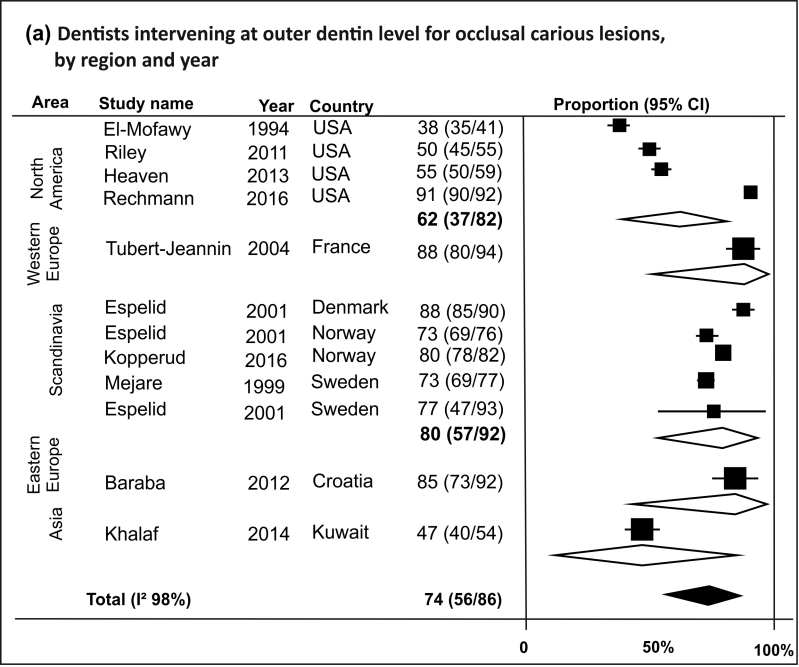
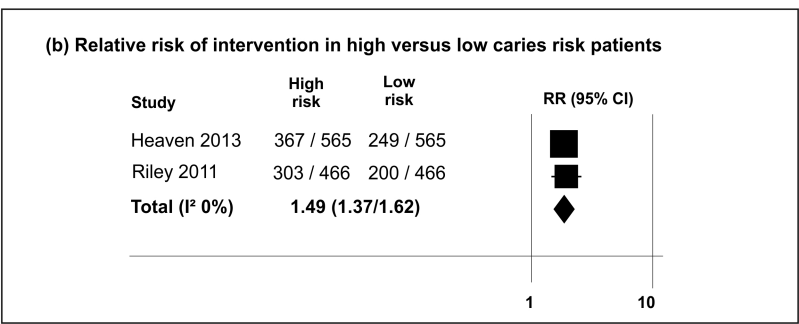

(a) Dentists intervening at enamel level for occlusal carious lesions, by region and year
Area
Study name
Year
Country
Proportion (95% CI)
North America
El-Mofawy 1994 Canada 21 (19/23)
Riley 2011 USA 11 (8/14)
Heaven 2013 USA 18 (15/24)
Rechmann 2016 USA 41 (39/43)
21 (11/36)
Western Europe
Tubert-Jeannin 2004 France 21 (14/31)
Scandinavia
Espelid 2001 Denmark 18 (15/21)
Mejare 1999 Sweden 6 (4/8)
Espelid 2001 Sweden 5 (3/10)
Espelid 2001 Norway 9 (3/24)
Kopperud 2016 Norway 12 (11/13)
9 (3/21)
Eastern Europe
Baraba 2012 Croatia 20 (12/32)
Asia
Khalaf 2014 Kuwait 4 (2/8)
Total (I² 98%)
12 (6/22)
0
50%
(b) Relative risk of intervention in high versus low caries risk patients
Study
High risk
Low risk
RR (95% CI)
Heaven 2013 141 / 565 57 / 565
Riley 2011 98 / 466 42 / 466
Total (I² 0%)
2.46 (1.94/3.00)
1
10


(a) Dentists intervening at E1/E2 level for proximal carious lesions, by region and year
Area
Study name
Year
Country
Proportion (95% CI)
North America
Swan 1993 Canada 24 (21/29)
el-Mowafy 1994 Canada 4 (3/5)
Kay 1996 Canada 53 (30/74)
Gordan 2009 USA 58 (54/62)
Riley 2011 USA 55 (50/59)
Heaven 2013 USA 61 (57/65)
Fellows 2014 USA 8 (4/12)
Gilbert 2014 USA 40 (35/45)
Rechmann 2016 USA 18 (16/20)
30 (14/48)
Western Europe
Mileman 1988 Netherlands 10 (7/14)
Nuttall 1990 Scotland 5 (4/6)
Kay 1992 Scotland 15 (5/38)
Kay 1996 Scotland 75 (52/89)
Tubert-Jeannin 2004 France 22 (15/32)
19 (7/41)
Scandinavia
Espelid 1985 Norway 21 (18/25)
Mileman 1988 Norway 22 (19/26)
Tveit 1999 Norway 4 (3/6)
Vidnes-Kopperud 2011 Norway 0 (0/0)
Mejare 1999 Sweden 1 (0/2)
Fellows 2014 Scandinavia 2 (0/14)
4 (1/11)
Eastern Europe
Zadik 2008 Eastern Europe 59 (38/77)
Baraba 2010 Croatia 42 (37/48)
Baraba 2012 Croatia 32 (22/45)
44 (17/75)
Australia/Asia
Riordan (dentists) 1991 Australia 11 (5/24)
Riordan (therapists) 1991 Australia 13 (9/18)
Tan 2002 Australia 5 (3/8)
Ghasemi 2006 Iran 54 (51/58)
Zadik 2008 Israel 58 (44/70)
Kakudate 2012 Japan 60 (53/67)
Khalaf 2014 Kuwait 10 (7/16)
24 (12/43)
Latin / South America
Maupome 1997 Mexico 45 (40/50)
Zadik 2008 Mexico 45 (20/78)
Bervian 2009 Brazil 18 (5/51)
25 (8/57)
Total (I² 98%)
21 (15/28)
0
100%


(b) Relative risk of intervention in high versus low caries risk patients
Study
High risk
Low risk
RR (95% CI)
Heaven 2013 441 / 565 249 / 565
Kakudate 2012 140 / 189 89 / 189
Ghasemi 2006 755 / 980 314 / 980
Gordan 2009 375 / 500 205 / 500
Riley 2011 336 / 466 182 / 466
Zadik 2008 13 / 22 1 / 22
Zadik 2008 34 / 52 3 / 52
Zadik 2008 6 / 11 2 / 11
Total (I² 83%)
1.98 (1.68/2.33)
1
10


(a) Dentists intervening at outer dentin level for occlusal carious lesions, by region and year
Area
Study name
Year
Country
Proportion (95% CI)
North America
El-Mofawy 1994 USA 38 (35/41)
Riley 2011 USA 50 (45/55)
Heaven 2013 USA 55 (50/59)
Rechmann 2016 USA 91 (90/92)
62 (37/82)
Western Europe
Tubert-Jeannin 2004 France 88 (80/94)
Scandinavia
Espelid 2001 Denmark 88 (85/90)
Espelid 2001 Norway 73 (69/76)
Kopperud 2016 Norway 80 (78/82)
Mejare 1999 Sweden 73 (69/77)
Espelid 2001 Sweden 77 (47/93)
80 (57/92)
Eastern Europe
Baraba 2012 Croatia 85 (73/92)
Asia
Khalaf 2014 Kuwait 47 (40/54)
Total (I² 98%)
74 (56/86)
0
50%
100%


(b) Relative risk of intervention in high versus low caries risk patients
Study
High risk
Low risk
RR (95% CI)
Heaven 2013 367 / 565 249 / 565
Riley 2011 303 / 466 200 / 466
Total (I² 0%)
1.49 (1.37/1.62)
1
10